EXECUTIVE SUMMARY

Chippewa National Forest
FY 1998 TSPIRS Report
(All dollars stated in 1998 dollars)

The Report

- The Chippewa National Forest **T**imber **S**ale **P**rogram **I**nformation **R**eporting **S**ystem (TSPIRS) report has been completed each year since 1987. This timber sale accounting system was developed jointly by the U.S. Forest Service and the General Accounting Office (GAO).

- The report serves as a source of annual timber financial information as well as a means to monitor the Forest Plan with regard to the timber program. Long-term costs and benefits attributable to the timber program are identified and compared to lands and situations where there would be no timber harvest.

Revenues and Values

- This is the seventh year the Chippewa's TSPIRS statement of revenues and expenses shows the Timber Sale Program to be "above cost." In 1998, revenues exceeded expenses by $1,114,652.

- In 1998, we received $4,520,829 for 60.4 million board feet harvested. This is an average price of $74.85 per mbf (thousand board feet) and reflects the value of timber sold from one to five years earlier.

- The value of **new** sales sold in 1998 was $4,051,993, exceeding total timber program costs by $645,816. When these sales are harvested, we will receive $67.53 per mbf.

- Average stumpage price for **new** sales sold in 1998 essentially remained stable overall (2.0 percent increase from 1997).

TIMBER PRICES
(Stated in 1998 dollars)

WORKING GROUP	PRICE/MBF				
	1994	1995	1996	1997	1998
Short Rotation Conifer	$90.05	$98.06	$74.35	$64.19	$70.08
Long Rotation Conifer	$183.18	$181.90	$167.51	$133.02	$160.26
Lowland Conifer	$62.12	$76.16	$50.76	$58.45	$58.84
Hardwoods	$54.63	$60.03	$33.43	$33.47	$38.87
Aspen	$52.85	$70.97	$52.86	$62.26	$64.59

- Total timber harvest revenues are projected to remain steady or decrease slightly in future years. This projection is based on the fact that we are currently receiving $74.85 per mbf of timber

harvested. When **new** sales sold are harvested, we will receive $67.53 per mbf, but the quantity harvested will be less.

Costs

- In 1998, it cost the Forest $56.39 for preparation, administration and reforestation of each mbf of timber harvested. Total program costs for 1998 were $3,406,177.

- Timber sale unit costs remained stable in 1998 (see table).

FIVE-YEAR COMPARISON

	1994*	1995*	1996*	1997*	1998
Average Stumpage Value of Sales Sold (per mbf)	$69.31	$84.44	$67.93	$66.23	$67.53
Average Unit Cost for Timber Harvested (per mbf)	$29.49	$36.55	$45.27	$56.67	$56.39

** Inflated to 1998 Dollars*

Economics

- Present net value (PNV) of long-term benefits and costs attributable to the 1998 timber sale program were $1,549,039.

- The outlook for the future remains positive due to continued demand for timber and non-timber resources enhanced by harvesting activities.

Wildlife and Recreation

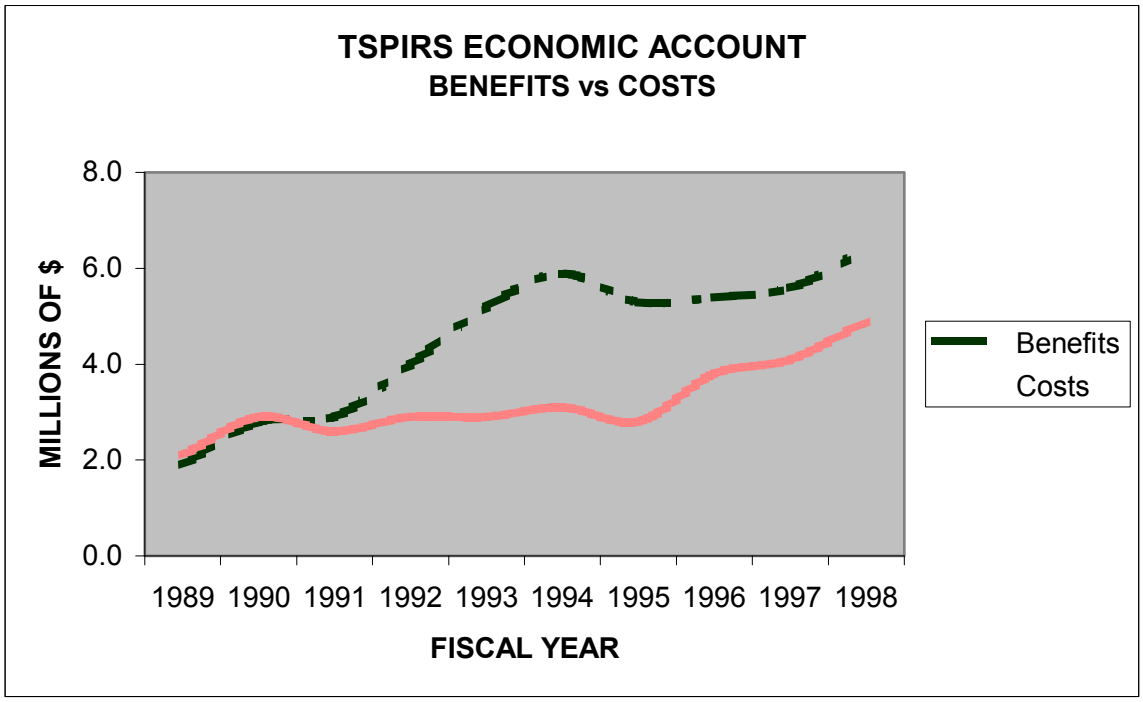
- Timber sale revenues are only one aspect of the entire Forest management program for the Chippewa National Forest. The timber sale program accomplishes vegetative management as prescribed in the Forest Plan to assure periodic renewal of the Forest and a diversity of habitats. It is integrated with other Forest resources to benefit game and non-game wildlife and recreation on the Forest.

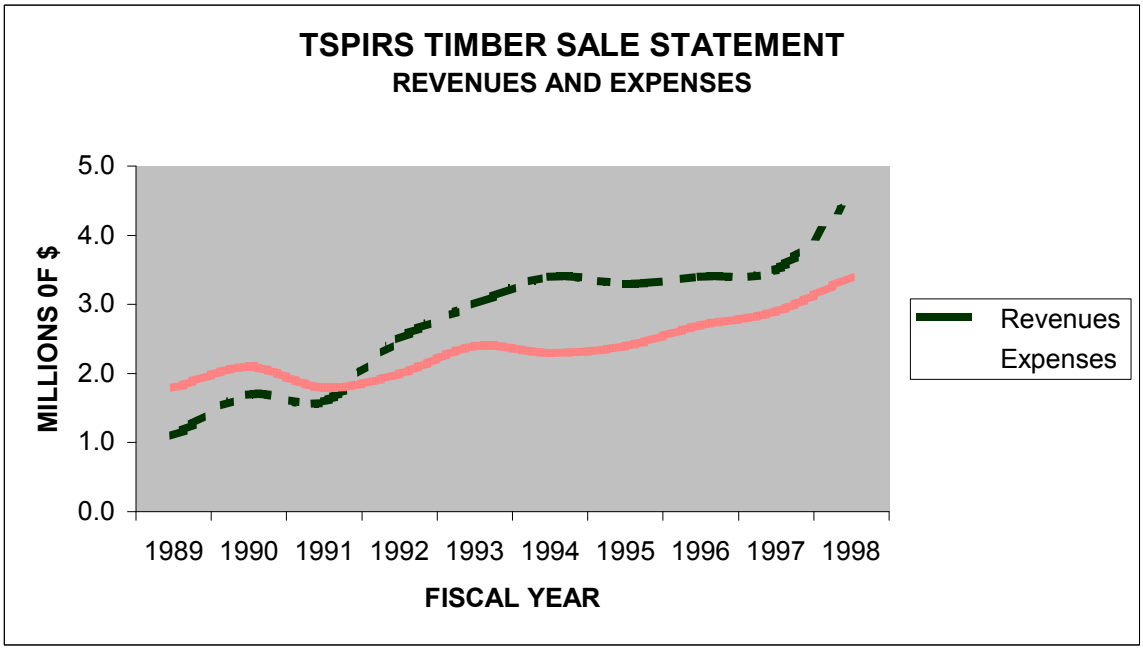
- Two species of special importance on the Forest are the American bald eagle and the gray wolf. Careful planning and coordination of resources have produced growth in the populations of both species.

Jobs, Income, and Payment to States

- Additional benefits resulting from the timber sale program are provided in he form of jobs, income, and taxes:
  - 490 jobs resulted from the program
  - $32.0 million in benefits to local economy
  - $4.8 million in Federal income taxes paid

- Approximately 25 percent of the revenues generated from the Chippewa National Forest timber program are paid to the State of Minnesota. The Chippewa National Forest paid **$1,258,083**, which the State distributed to the counties and targeted for use in school and road programs.





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TIMBER SALE PROGRAM INFORMATION REPORTING SYSTEM
Fiscal Year 1998

TABLE OF CONTENTS

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TIMBER SALE PROGRAM INFORMATION REPORTING SYSTEM (TSPIRS)

Fiscal Year 1998

(Fiscal Year 1997 is the period from October 1997 - September 1998. Throughout the rest of this document any year referred to will be the fiscal year unless otherwise noted.)

PURPOSE AND NEED

The Timber Sale Program Information Reporting System (TSPIRS) was created in response to the "below-cost" timber sale issue. Public concern over the economics of National Forest timber sales resulted in Congress directing the Forest Service to develop an expanded timber cost accounting system. Congress also directed the General Accounting Office (GAO) to work with the Forest Service to develop the basic design of a cost accounting system that would provide cost and revenue information for Forest Service managers and for congressional oversight.

The development of a timber sale accounting system was complicated by the fact that costs and benefits from the timber sale program overlap with costs and benefits from other programs (wildlife, soil and water, etc.) and extend several decades into the future. Following extensive development and testing, the Forest Service and GAO concluded that no single account could adequately portray all of the various kinds of information needed for a cost accounting system and for monitoring implementation of the Forest Plan. Consequently, three accounts were developed as a means to monitor Forest Plans and to present information on Forest Service timber sale programs. Each account displays a different way of looking at the benefits and costs of the Forest's timber sale program:

STATEMENT OF REVENUE AND EXPENSES: A financial account of a National Forest administrative unit's timber sale program for a fiscal year. This cost accounting report deals exclusively with the timber sale program and is well grounded in generally accepted accounting principles.

THE ECONOMIC ACCOUNT: An economic account displaying the long-term costs and benefits of a National Forest's timber sale program. A comparison was made using the with and without approach. In 1998, 6095 acres of timber were harvested on the Chippewa National Forest. Of these 6095 acres, 1339 were thinned and 4756 were final harvested. Calculations were made to estimate the benefits and costs that would have occurred on these acres over the long term had there been no harvest (without). A separate set of calculations was made to determine the future costs and benefits following the harvest (with). These two sets of calculations can be compared to determine whether long term priced benefits are greater with or without the timber sale program.

EMPLOYMENT, INCOME, AND PROGRAM LEVEL ACCOUNT: An account displaying employment, income, and the quantities and values of timber products resulting from the Chippewa's 1998 timber program. Employment and income impacts are derived from a computer model called IMPLAN.

STATEMENT OF TIMBER SALE REVENUES AND EXPENSES

PURPOSE

The Statement of Timber Sale Revenues and Expenses provides a reasonably accurate and useful measure of revenues and costs associated with the timber sale program on the Forest. This account presents cost accounting information in an income statement format. This report serves as a source of timber financial information and often is a significant factor in Forest management decisions.

METHODS AND ASSUMPTIONS

The Statement of Timber Sale Revenues and Expenses accounting procedures and presentation format were revised in 1992 and again in 1993. Brown and Company, Inc., an independent public accounting firm, and GAO reviewed this account and recommended changes that better match revenues from harvested timber with costs.

Key elements of the account include:

- Sale Program Categories: Revenues and costs are tracked by three categories, describing timber sale resource purpose -- Timber Commodity (commercial), Forest Stewardship (multiple-use sales) and Personal (noncommercial). Timber sales are designed to achieve the objectives set in the Forest Plan. It is the Forest's policy that our publics realize multiple benefits from all timber sales.

- Revenues: Revenues are recognized at the time the title to the timber changes from the Forest Service to the timber purchaser. Cash and effective road credits are both considered as revenues. Purchaser Road Credits are reported as revenue when the credit is applied against harvested timber or, if the credit is not applied, when the timber sale is closed.

- Costs: Costs are categorized under direct or indirect expenses. Within those two categories, expenses are further grouped as either single-year expenses (i.e., timber harvest administration) or as multiyear costs (i.e., reforestation).

  Single-year costs are those directly related to the revenue generated in the year they are incurred. Single-year costs consist of General Administration program costs, harvest administration, timber planning, transportation planning, and appeals and litigation.

  Multiyear costs associated with timber sales fall into four categories:

  1. The "sale activity pool" accumulates multiyear costs in the stages of sale planning, inventory, and sale preparation, i.e., costs attributed directly to specific sales. They occur after sale boundaries have been identified and are sale specific. Costs accumulated in this pool are annually expensed out based on the relationship of the volume harvested to the volume of sales under contract during the fiscal year (volume uncut under contract plus volume harvested) for the National Forest.

The sale activity pool accumulates multiyear costs for stages of specific sale planning and reforestation. Costs accumulated in this pool for specific sales are for: silvicultural examinations, sale preparation, analysis/documentation, appeals/litigation-sales, other resource support, brush disposal fund, erosion control, and cooperative road maintenance.

2. The "growth activity pool" accumulates all other multiyear costs in the growth stage of the rotation cycle, i.e., these are out-year investment costs. They occur before specific sale boundaries are established or are general in nature. Costs accumulated in this pool are annually expensed out based on the relationship of the average volume harvested to the estimated volume to be harvested over the average timber rotation period for a National Forest. The average rotation age for the Chippewa National Forest is 67.8 years. (Average rotation age is the average age at which timber stands are to be harvested according to the Chippewa Forest Plan.) Costs in the growth activity pool are: appropriated reforestation, appropriated timber stand improvement, genetic tree improvement, KV timber stand improvement, and KV reforestation.

   Landline location and appropriated road maintenance costs were assumed to be stewardship costs and therefore not included in this report. Stewardship costs are land management and protection costs.

3. The "facilities depreciation pool" category accumulates all facility asset costs and depreciates the value on a 30-year life straight line basis. These are the costs of improvements, additions and betterment of timber related facility assets.

4. The "road assets being depreciated" are now captured in a stand alone cost category. Previously, road design and construction costs associated with timber sales were included in the "growth activity pool." Now, they are capitalized and depreciated by component. Road components which are recognized include the prism, surface, culverts and bridges. Road prism costs are non-depreciable, while other road costs are depreciated over assigned useful lives. Road surfaces are considered to have a 10-year useful life. Culverts have a 30-year useful life and bridges have a 50-year useful life.

DISPLAY OF STATEMENT OF TIMBER SALE REVENUES AND EXPENSES

The table below displays what was expensed out, through the different pools, not what actually was spent in FY 1998.

TSPIRS
STATEMENT OF TIMBER SALE REVENUES AND EXPENSES
FISCAL YEAR 1998

	ACCOUNT DESCRIPTION	*TIMBER COMMODITY SALES	FOREST STEWARDSHIP SALES	PERSONAL USE SALES	TOTAL ALL SALES
I	REVENUES				
	Timber Sales	3,134,986	1,326,900	$2,634	4,464,520
	Purchaser Road Credit	9,844	1,446		11290
	Associated Charges	21,417	21,127		42544
	Interest & Penalties	1,357	1,118		2475
	Total Revenues	**3,167,604**	**1,350,591**	**2,634**	**4,520,829**
II	EXPENSES				
	DIRECT EXPENSES				
	Timber Sale Direct Exp.	1,632,642	925,189	14,442	2,572,273
	Timber Program Direct Exp.	281,584	135,948		417,532
	Total Direct Expenses	**1,914,226**	**1,061,137**	**14,442**	**2,989,805**
	INDIRECT EXPENSES				
	Timber Sale Indirect Exp				-0-
	Timber Program Indirect Exp.	280,801	135,571		416,372
	Total Indirect Expenses	**280,801**	**135,571**		**416,372**
	Total Expenses	**2,195,027**	**1,196,708**	**14,442**	**3,406,177**
III	GAIN BEFORE PAYMENT TO STATE	972,577	153,883	11,808-	**1,114,652**
	Volume Harvested (mbf)	40,716	19,659	1	60,376

** Timber sales are designed to achieve the objectives set in the Forest Plan. All sales achieve multiple public benefits.*

Timber Commodity Sales are sales whose primary objective is for providing forest product raw material to contribute to the Nation's timber supply. Timber harvested from timber commodity sales are not for personal use or other resource purposes. These sales are designed to achieve the timber volume objectives of the Forest Plan.

Forest Stewardship Sales are timber sales which are designed primarily to achieve Forest stewardship objectives that require vegetation management as outlined in the Forest Plan. Timber harvest must be shown to be the most financially efficient way of achieving the Forest Plan vegetation management objective (i.e., it produces the least net cost when both current costs and revenues are considered). As a general rule, if the Forest had no timber program or if there was no demand for the timber being harvested, these vegetation management projects would normally be accomplished through some other means such as controlled burning. Where timber harvest is selected to achieve the Forest stewardship objective, the sale of timber is secondary to achieving that objective.

Personal Use Permits or forest product sales of any size or value where the presumption is that the purchaser will use the material for personal use rather than for manufacture and/or resale.

STATEMENT OF TIMBER SALE REVENUES AND EXPENSES ANALYSIS

The Chippewa National Forest's timber program had revenues of $4,520,829 and total direct and indirect expenses of $3,406,177, for a net gain of $1,114,652 before payments to the State. Required by law, the payments to the State are 25 percent of all moneys received during the fiscal year. The Chippewa's timber program contributed $1,258,083 to the State of Minnesota in 1998. These dollars were distributed to counties and are targeted for use on school and road programs.

The Chippewa's timber program is only one facet of the entire Forest Management program. The timber sale program also increases benefits to the wildlife and recreation programs. These benefits are not reflected in the Statement of Timber Sale Revenues, but the costs of providing the benefits are included in the expenses. The Chippewa National Forest is striving to integrate its programs in an interdisciplinary approach to forest management. Foresters, wildlife biologists, landscape architects and other professionals worked together to design these sales so that they would provide positive multiple benefits in wildlife, recreation, and timber.

THE ECONOMIC ACCOUNT

PURPOSE

The *Economic Account* is used to monitor the Forest Plan (especially with regard to the timber sale program) and to identify the long-term costs and benefits attributable to the 1998 timber sale program. This is done by comparing the future costs and benefits occurring on the harvested lands with the costs and benefits on those same lands had there been no harvest.

METHODS AND ASSUMPTIONS

Forest Plan Monitoring:

Timber sale program direction was set in the Chippewa's Forest Plan. It established the allowable sale quantity (ASQ) at 79 million board feet (mmbf) per year. However, through monitoring and as a result of extensive study, we have concluded that an annual sell volume of 79 mmbf is not sustainable. A more realistic average annual sell volume is 64 mmbf. We expect to offer up to 64 mmbf for sale annually until the Forest Plan is revised. The Forest Plan revision process will determine the future ASQ for the Forest. During the interim, we may offer more than 64 mmbf some years while others we may sell less than 64 mmbf. In 1998, the Chippewa sold 60 mmbf of timber.

While 60.0 mmbf was sold in 1998, 60.4 mmbf of timber was actually harvested. Sold and harvested volume seldom match because there is a one- or two-year delay between the time a sale is sold and the time the timber operator first begins harvesting. Much of the timber harvested in 1998 was from timber sales sold in the previous one to five fiscal years. Over the 15-year period of the Chippewa's Forest Plan, however, total timber sold and total timber harvested will be very nearly the same.

The information used and assumptions made in preparing the *Economic Account* followed prescriptions used in the Forest Plan. We used 1998 as the base year and timber harvest activities conducted that year were projected into the future to determine the efficiency of our timber program. Average costs for the various activities and stumpage prices were calculated using 1994 through 1998 data information provided from the *Statement of Revenues and Expenses*.

Long Term Costs and Benefits:

The *Economic Account* reports future net economic benefits from the harvest acres treated in 1998. The report is an accounting of the future economic value, in terms of present net value (PNV), from the base year's timber program expenditures. PNV is the difference between discounted benefits and discounted costs associated with all outputs for which monetary values can be assigned. The benefits and costs are based only on the acres of timber that were harvested on the Chippewa in 1998.

Present net value was calculated using a four percent discount rate. Costs and prices were assumed not to change, on a real basis, during the analysis horizon and all costs and revenues are expressed in 1998 dollars.

Timber costs and revenues and nontimber costs and benefits were analyzed separately because the time horizon for the two analyses is different. The timber analysis evaluated the costs and benefits over successive rotations beginning immediately after stand reestablishment. Nontimber costs and benefits were analyzed over a 50-year period beginning just prior to harvest. Because the nontimber impact assessment takes an incremental approach, the consequence of limiting the analysis to 50 years was viewed as minimal. The net effect of the past year's harvest was viewed to be greatest in the near term, less in the distant future.

The *Economic Account* specifically considers the economic value of both benefits and costs. Priced benefits are subdivided into market and nonmarket benefits. Market benefits are those which are routinely traded in an established market and return actual cash dollars to the U.S. Treasury. In this analysis, timber and fuelwood are the only resources priced in the marketplace.

Nonmarket benefits are those positive and negative benefits which are not customarily sold in an established local market and, therefore, do not return actual cash dollars to the U.S. Treasury. However, a dollar value can be assigned to nonmarket benefits. This value represents what a user would be "willing-to-pay" for the benefits if an established market existed. Nonmarket benefits in this analysis include the value of recreation from increased wildlife related activities, Christmas tree cutting activity, soil productivity and berry picking.

The PNV estimated for the Economic Account provides an indication of the attainable net benefits that can be quantified. However, it should be noted that the PNV is only one of several measures used to determine net public benefits. Non-priced benefits and costs must be considered when drawing conclusions about individual timber sales or programs.

Non-priced benefits are outputs for which there is no available market transaction evidence and a reasonable basis for estimating a value commensurate with market values associated with priced outputs does not exist. Non-priced benefits on the Chippewa National Forest include the enhancement of threatened and endangered species, scenic quality, and an increase in income and local employment.

Since it is not possible to assign monetary value to non-priced benefits and costs, they are not included in the PNV calculations in the *Economic Account.* The non-priced benefits are measured qualitatively using a variety of indicators or through the use of narrative discussions.

1. Market Priced Costs and Benefits

TIMBER

Acres harvested were divided into the five working groups used in the Forest Plan. They are defined as follows:

- Short rotation conifers (Working Group 1) - includes jack pine and balsam fir;
- Long rotation conifers (Working Group 2) - includes red pine, white pine, and white spruce;
- Lowland conifers (Working Group 3) - includes black spruce, cedar, tamarack, and mixed swamp conifer;

- Upland hardwoods (Working Group 4) - includes oak, lowland hardwoods, northern hardwoods, and paper birch;

- Aspen (Working Group 5) - includes only aspen.

Using our Combined Data System vegetation database, we stratified timber harvest activities into these working groups and determined acres cut for both intermediate and regeneration cuts.

The working groups were analyzed by management prescription which is shown on the following table.

WORKING GROUP PRESCRIPTIONS

	Years				
WORKING GROUP	**EXISTING ROTATION AGE**	**REGEN. ROTATION AGE**	**THIN CYCLE**	**REGEN. METHOD ***	**TSI**
Short Rotation Conifer	50	50-80		BF-natural JP-plant	N/A Release
Long Rotation Conifer	60-150	70-150	10-20 **	plant	Release
Lowland Conifer	70-130	90-130	--	BS-seed/plant Other-natural	Release N/A
Hardwoods	50-150	50-150	--	natural	N/A
Aspen	40-70	40-60	--	natural	N/A

** All regeneration prescriptions included site preparation activities.*
*** Red and white pine only.*

Because of the mixture of species used in the working groups, weighted averages were used to interpret and display cost and price information. All values are expressed on a $/acre value.

Following is a summary of costs calculated during the process of completing the *Economic Account*:

ACTIVITY	**COST/UNIT**
Stand Examination *	$2.43/Acre
Timber Planning *	$1.28/Acre
Transportation Planning *	$0.75/Acre
Other Resource Support *	$9.67/Acre
Road Design and Construction	$10.84/Acre
Sales Preparation	
Final Harvest	$144.23/Acre
Intermediate Harvest	$173.08/Acre
Sales Administration	
Final Harvest	$64.46/Acre
Intermediate Harvest	$90.24/Acre
Natural Reforestation	$55.33/Acre
Artificial Reforestation	$443.78/Acre
Timber Stand Improvement	$110.24Acre

** Costs per unit are based on acres examined during FY 1998.*

Other costs are based on acres cut or sold.

The following was assumed when gathering data and calculating per unit costs shown on previous table. Weighted averages for five years (1994-1998) were used.

Stand examination, timber planning, transportation planning, and other resource support unit costs are based on acres examined for future timber harvest rather than acres cut. This is in line with true costs per acre because of the need to repeat and/or validate information in our data base every ten years.

Sales preparation unit costs are based on acres sold. By using a five-year average unit cost, we are better able to match true costs for sale preparation to those acres that will be sold instead of harvested. Final harvest acres cost less to prepare than intermediate harvest acres. Final harvest practices include removing all trees except scattered reserve trees. Intermediate harvest prescriptions may require individual tree selection for harvest. This requires additional time spent on sale preparation.

Sales administration costs are based on acres cut also using Cut and Sold Report data and verification with *Statement of Revenues and Expenses*. As with sale preparation costs, final harvests and intermediate harvests have different sale administration needs. With an emphasis on protecting the residual trees, more time must be spent on intermediate harvests doing complete administration. Therefore, unit costs are higher for intermediate acres than for final harvest acres.

Reforestation costs include the site preparation, stock costs, labor costs, etc., to reforest the site and the stocking and certification surveys. Actual acres reforested were used as a basis for calculating weighted averages. Artificial reforestation costs consider a variety of site preparation methods and planting versus seeding in determining weighted averages. Differences in appropriated versus KV accomplishments were also considered to derive the weighted average cost to use for artificial and natural regeneration. This enabled us to separate costs for natural and artificial regeneration for each species within the working groups (i.e., jack pine vs. balsam fir).

Timber stand improvement costs were calculated by using weighted averages of the appropriated and KV expenditures similar to the reforestation costs.

Stumpage prices were determined by using 1998 averages for each working group. Data from the Cut and Sold Reports was used to compile this information. Pulpwood and sawtimber prices were also combined, using the weighted average procedure. See following table.

TIMBER PRICES

WORKING GROUP	PRICE/MBF
Short Rotation Conifer	$70.08
Long Rotation Conifer	$160.26
Lowland Conifer	$58.84
Hardwoods	$38.87
Aspen	$64.59

In projecting volumes for both present net value (PNV) and soil expectation value (SEV) computations, the yield tables developed for FORPLAN were used. The expected volumes are based on total acres cut without subtracting the effects of permanent openings constructed, roads and the effects of leaving residual trees. These were already accounted for when the yield tables were developed.

Red and white pine were the only species with planned intermediate harvests in future rotation periods. Those pine are planned to be thinned at intervals of 10 to 20 years starting at age 40.

Rotation age for each working group was also determined using the weighted average approach. We considered the visual quality objectives and need for old growth retention, particularly for pine and hardwood, in determining the appropriate rotation age to use.

FUELWOOD

The public may gather personal use fuelwood from completed timber sales. Permits are issued at the Ranger District offices and the Supervisor's Office. In 1998, 267 personal use fuelwood permits were issued. A total volume of 534 mbf was removed from the Forest. This converts to 84 mcf (thousand cubic feet). The Resource Planning Act (RPA) assigns fuelwood values for different regions of the country. The value assigned to Region 9 and the Chippewa National Forest is $47.84 in 1998 real dollars. Total value of the fuelwood removed from the Forest is $4174. Costs attributable to administering the fuelwood program were $708. Total benefits derived during 1998 were $3,466 ($4174-$708).

ROADS

Transportation planning and cooperative maintenance road costs were included in the analysis. Road reconstruction costs were assumed to occur prior to harvest and not repeated.

The discounted cost of all future timber sale road construction for the area harvested in 1998 is $110,560. The costs are based on future entries into 1998 harvested acres. Costs for road construction to access final harvest acres are projected to occur at Forest Plan rotation age for each forest type. Costs for road construction into intermediate harvest acres are projected to occur at age 40 when the first commercial harvest is feasible.

The discounted cost of all future timber sale road reconstruction for the area harvested in 1998 is $4,525.

2. Nonmarket Priced Costs and Benefits

WILDLIFE

There are 325 species of vertebrate animals on the Chippewa National Forest. Most of these are associated with forested habitats for at least part of their life requirements and timber harvest has a profound effect on their populations. Some will benefit from the regeneration of mature stands of timber, while others will find the habitat less suitable. Mitigation and coordination of the timber sale program with the needs of wildlife, such as leaving snags and reserve trees, reduces some of the

negative effects of timber cutting. Special consideration is given threatened and sensitive plants and animals when they are associated with timber sale areas.

The economic "valuation" of wildlife benefits from the timber harvest program in 1998 is based on the estimated amount of money spent by hunters and non-consumptive users for the opportunity to hunt and/or observe wildlife. The analysis incorporates the estimated changes in certain wildlife populations resulting from timber harvest and the subsequent use of the resource by people over five decades. Species used for determining economic values are white-tailed deer, ruffed grouse, snowshoe hare, American woodcock and all nongame species as a group.

In 1998, the basis for estimating changes in population density and the associated values were derived from a computer model called HABCAP (Habitat Capability). The model computes population densities for the selected species, based on timber types and age classes, multiplies this by a standard value for recreation visitor days per animal, and multiplies this by the RPA dollar value for each species or group. This results in an estimated value from hunting and nonconsumptive use. The model was used to project the values into future decades as it "grows" the timber. Values used as constants in the model were derived from planning documents of the Chippewa National Forest and the 1991 National Survey of Fishing and Hunting. The variables used were the mix of types and ages over a 50-year period, comparing values "with" the timber sale program and "without" the timber sale program. The values thus obtained were discounted at four percent.

The results of this analysis indicated that if the timber harvest in 1998 had not occurred, these acres would have generated $1,860,943 in wildlife-related benefits over a 50-year period. With the harvest, the same acres will generate $2,402,158. Therefore, there is a net value of $541,215 directly attributed to the 1998 timber sale program.

SOILS

Our ability to quantify timber harvesting impacts on soils in terms of reduction in timber or forage growth is presently limited. To better address these impacts, the Chippewa National Forest is participating in a national "Long Term Site Productivity" study. The study is looking at several levels of nutrient removal and soil compaction over a range in soil conditions. The plots are established and systematic monitoring is underway. Better data will become available as this study progresses over the next several years.

From Forest monitoring efforts over several years, we know that harvesting activities can impact the long-term productivity of the soil. These impacts to the soil resource vary by soil/site conditions, season of operation, weather, type of equipment, operator, and sale administration. However, soil impacts are mitigated through adherence to Forest Plan standards and guidelines and Best Management Practices.

Low or no impacts have occurred on the portions of the harvest area where the litter layer has been moved exposing the humus layer and/or one to two passes of heavy equipment have taken place. Moderate impacts have occurred on those portions of the harvest area where the litter and humus layers have been moved exposing mineral soil and/or three or more passes of heavy equipment have taken place. High impacts have occurred on those portions of the harvest area where the litter,

humus, and upper mineral layers have been removed exposing the mineral horizon and/or were used for major skid trails, landings, and temporary roads. In general, 80 to 90 percent of the harvest areas falls into the no or low impact category.

We have quantified the loss in long-term productivity by estimating the value of the timber volume loss expected in the next rotation. Based on monitoring from aerial photographs, we determined that 3 percent of the final harvest acres of aspen, hardwood, paper birch, and balsam fir types sustained high impact on soil productivity. Twelve percent of those four forest types sustained medium impacts to the soil productivity. The remaining acres sustained low or no impact. For this calculation, only medium and highly impacted acres are considered for timber volume losses.

By projecting the future decline in harvestable volume and multiplying by current stumpage prices, we are able to estimate a dollar loss from current harvesting activities. We discount that future value to the present for a negative impact of $32,188.

BERRY PICKING

Berry picking is an important recreational activity on the Chippewa National Forest. Several types of berries can be found on the Forest; the most important being raspberries, strawberries, Juneberries, chokecherries, and blueberries.

Demand for easily accessible berry picking areas exceeds supply on the Chippewa. Supply of good berry picking areas can be increased through vegetative manipulation. Berries grow best in sunny open areas and thus respond well to such vegetative management methods as timber harvesting and the construction of permanent openings. Berry production generally begins two years after the construction of openings or the harvesting of timber. In harvested areas, good berry crops generally last about four years. After four years the next generation of trees begins to over-top the berry bushes, blocking out the sun.

Assumptions:

a) In 1998, 4,831 acres of timber harvest areas were deemed capable of producing berries.
b) It was estimated that 10 percent of these acres would be desirable and accessible to berry pickers.
c) A total of 483 acres of good berry picking areas were created by harvesting timber and prescribed burning.
d) It was estimated that 2.5 activity days or 1 recreation visitor day (RVD) per acre per year would be spent berry picking on these 303 acres for four years, beginning two years after timber harvest.
e) A berry picking RVD is worth $28.82.
f) Total per acre value of four seasons of berry picking discounted to the present is $100.59.

Based on these assumptions we estimate that the berry picking benefits from 1998 timber harvesting will be $48,585.

CHRISTMAS TREES

Christmas tree cutting is a popular activity on the Forest. Permits may be purchased at the Ranger District offices. The success of the activity is a direct result of our timber program. We plant conifers for future timber harvest, but open the plantations up to the public for Christmas tree cutting when the stands are young and the trees are open grown.

During fiscal year 1992, the Forest assisted the University of Minnesota Extension Service in a survey to determine how much recreation time is actually spent on a Christmas tree cutting activity.

The following data was gathered and is incorporated with RPA dollar valuation to quantify the value of our Christmas tree cutting program on the Forest for 1998.

a) Number of permits sold in 1998: 574.
b) Number of recreation visitor days (RVDs) for each Christmas tree cutting activity: 0.36.
c) Value per RVD (as per Resource Planning Act pricing tables for "Other Recreation Values"): $79.36.
d) Value per Christmas tree cutting activity (0.36 x $79.36): $28.57.
e) Total Christmas tree cutting program value before costs (574 permits x $28.57): $16,399.
f) Costs (office and compliance): ($1,529).
g) Total benefits derived from 1998 Christmas tree cutting activity ($16,399-$1,529): $14,870.

BOUGH CUTTING

Bough cutting activity is increasing on the Forest. Numerous small businesses begin seasonal operations in the fall and continue through early December, making wreaths and sprays for the holiday season. Permits are issued by the Ranger District offices and the Leech Lake Tribal office for gathering boughs on the Forest.

The bough cutting and wreath making provides a large number of individuals with seasonal employment and the local economies receive a substantial benefit from the added income.

The following data was gathered and was used to quantify the value of the bough cutting program on the Forest for 1998:

a) Number of permits issued: 224.
b) Number of tons under permit: 448.
c) Estimated pounds harvested and useable: 336,000 pounds.
d) Value of boughs: $0.12/pound.
e) Total bough value before costs: $40,320.
f) Costs (office and compliance): $1,920.
g) Loss of potential volume due to reduce growth of trees: $2,260.
h) Total benefits derived from 1998 bough cutting activity ($40,320-$1920-$2260): $36,140.

3. Nonmarket Non-Priced Costs and Benefits

DEVELOPED RECREATION

The placement and timing of timber harvesting did not impact developed recreation areas. Timber harvest activities did not impact the amount of use or the level of service occurring at developed recreation areas.

DISPERSED RECREATION

The impact of timber harvesting on dispersed recreation activities occurring on the Forest cannot be accurately determined. Any recreation use that may occur as a result of timber harvest activities in most instances would not be an increase in overall Forest recreation use. In some instances timber harvest activities may actually displace recreation use, but this use would, in most instances, just shift to a different location on the Forest.

FIRE

The timber sale program can significantly reduce the risks of large scale catastrophic fire in several ways. Timber sales, when followed with proper fuel hazard mitigation measures, can reduce the long-term buildup of fuels resulting from dead and dying timber from various causes (e.g., insects, disease, windthrow, senescence, etc.). When properly designed, timber sales can have beneficial ecological effects by mimicking the stand replacement effects of fire on species with high intensity fire regimes such as jack pine without the risks of large stand replacement fires. In light surface fire regimes, such as red and white pine, thinnings can reduce the volume of flammable vegetation in the understory similar to the stand maintenance effects of surface fires, and thus reduce the threat of high intensity crown fires in those stands. Large fire risk is also reduced through timber management by creating vegetative fuel breaks through the mixing of age classes and tree species composition.

FISH

The effects of timber harvest activities on the fisheries resource can not be determined accurately at this time. The Chippewa National Forest does not have standards and guidelines nor monitoring standards designed specifically to protect fish habitats. However, water quality impacts, which also effect the fishery, are mitigated through adherence to Forest Plan standards and guidelines and Best Management Practices.

HERITAGE RESOURCES

Timber harvesting activities create no impacts that benefit heritage resource sites. Potentially negative impacts are mitigated through adherence to Forest Service Manual direction and Forest Plan standards and guidelines.

INSECT AND DISEASE

Insect and disease problems are generally found in overstocked and overmature stands of timber. They may also be found in stands that have been weakened by drought and wind storms. The timber sale program reduces the risk of damage from insects and disease by thinning them when needed. Pine and spruce stands benefit most from thinning. Timber harvesting followed by site preparation for natural regeneration converts overmature and drought weakened stands for the purpose of returning them to a thrifty, productive condition.

MINERALS

The major minerals activity on the Chippewa is the common variety or gravel program. Economic benefits from this program have been captured in the transportation program and are reflected as reduced road construction and maintenance costs. Although the government does not charge itself for the
mineral material used in road construction and maintenance, it does assess a value of $0.35 per cubic yard of loose pit material for administrative reporting purposes to the Regional Office and the Washington Office.

RANGE

Currently, virtually no demand exists for the Chippewa's forage resource. This demand situation is not expected to change in the foreseeable future.

VISUAL RESOURCES

Timber harvesting activities may impact the quality of recreation experiences available on the Forest. In some situations this may be a positive impact such as providing vistas, thinning or "cleaning up" stands, or enhancing favored species including hardwoods and conifers. Negative impacts result when timber
harvest activities reduce the quality of the visual landscape that is viewed by the recreationist. These negative impacts are reduced significantly through planning and design that recognizes the visual resources concerns.

The timber sale program is used to enhance aesthetics on the Chippewa National Forest. Critical areas for visual aesthetics are along transportation routes (roads, trails, lakes, streams and rivers). Through integrated resource management, interdisciplinary teams use timber harvesting techniques to enhance scenic quality and meet visual quality objectives defined in the Forest Plan. Potentially negative impacts such as logging slash are appropriately mitigated according to Forest Plan standards and guidelines.

WATER

No values were assigned to water resources. No measurable benefits resulted from timber harvesting. The Forest follows guidelines and Best Management Practices that reduce the chance for sedimentation to surface waters. Specific data on erosion and sedimentation rates have not been measured for various harvest methods.

Changes in water yield and timing were not addressed during the Forest planning process as a recommended or beneficial effect of timber harvest. Increased base flow in a watershed may occur as a result of timber harvest. Within the Forest's influence, no down stream beneficial use of additional flows has been identified.

WILDLIFE

Timber harvest has a significant impact, both negative and positive, on wildlife habitat and population response that cannot be measured in terms of direct economic values. The 325 vertebrate species on the Chippewa have intrinsic values related to ecologic relationships, aesthetic appreciation, and nonconsumptive uses that may exceed the estimated importance for consumptive uses having a basis for cost/benefit analysis.

Since it is exceedingly complex to deal with 325 species, all having different habitat needs, the concept of Management Indicator Species (MIS) was used, as prescribed in the regulations pursuant to the National Forest Management Act. Twelve MIS were selected to represent the communities on the Chippewa and are used to address the effects of the 1998 timber sale program on wildlife populations.

Indicator species associated with each of the working groups are analyzed by estimating the effects for each decade through a normal rotation using the "with" and "without" timber harvest concept. It is important to know that without timber harvest there are also positive and negative effects, as the communities change with time. These effects must be weighed against those associated with timber harvest.

All species are considered equal in value and importance, although two of the indicators are threatened and four are game animals.

Considering all working groups together, **FY 1998 timber sale program is generally favorable to wildlife, especially considering that about 56 percent of the acres cut are aspen/birch, which has the highest inherent wildlife values associated with management.**

DISPLAY OF THE ECONOMIC ACCOUNT

FY 98 TSPIRS ECONOMIC ACCOUNT

PRESENT VALUE OF BENEFITS	
Positive Effects	
Timber	$5,897,548
Wildlife	$569,713
Recreation	$64,984
Total	$6,532,245
Negative Effects	
Wildlife	$28,498
Soils	$32,188
Total	$60,686
Total Present Benefits	**$6,471,559**
PRESENT VALUE OF COSTS	
Timber	$4,427,025
Roads	$115,085
Wildlife	$357,783
Watershed	$7,607
Recreation	$15,020
Total Present Costs	**$4,922,520**
PRESENT NET VALUE	**$1,549,039**

INTERPRETATION OF THE ECONOMIC ACCOUNT

The present value of timber benefits figures increased by about $124,200 over 1997. The present value of timber costs increased by $796,407.

This increase in benefits and relatively large increase in costs is attributable to:
1) increased costs and less revenues associated with implementing ecosystem management; and
2) an increase in thinning acres harvested.

Silvicultural prescriptions designed to implement ecosystem management tend to increase costs and lower revenues when compared to traditional clearcuts. More analysis and documentation is needed to address the issues and concerns of a more interested but polarized public. More work is required, primarily the work associated with designating individual trees rather than stands of timber, of timber sales. Larger number of trees are reserved to provide for biological diversity and wildlife needs, which reduces the volume per acre of timber harvested. Harvest operations are slowed in order to protect reserved trees and reserved areas. The lower volume per acre and reduced production rates are reflected in lower bid prices (revenues) for timber sales.

Thinning acres represented 22 percent of harvested acres in 1998. Compared to a final harvest, a commercial thinning costs 20 percent more per acre to prepare and 40 percent more per acre to administer. The logging costs are also higher for commercial thinnings, which translates into lower stumpage prices when compared to final harvest.

Long-term road construction costs decreased 61 percent from the 1997 program. Road building, reconstruction, and maintenance expenditures associated with the timber program vary over time depending on percentage of "thinning" options harvested during the year and existing roads available for use in hauling timber off the Forest.

Priced Market Benefits:

The *Economic Account* indicates that long-term benefits associated with the 1998 timber harvest exceeded costs by $1,549,039. The procedure used to calculate Present Net Value (PNV) is consistent with that used in the 1989-1997 reports.

The timber calculation starting point begins immediately after the decision is made to harvest those acres cut. In other words, sales preparation, sales administration reforestation costs, and harvest revenues occur within a five-year period.

Future timber program revenues are received from thinning immature and final harvesting mature timber. Thinning revenues will be realized every 10 to 20 years beginning at age 40 in long rotation conifers and occasionally in northern hardwood timber types. Thinned timber will also produce revenues at a final harvest. The first major investment under the thinning option followed by final harvest occurs immediately after final harvest with stand reestablishment.

For timber types treated only with a final harvest and no intermediate thinnings, revenues are realized only once at rotation age. Immediately after harvest, costs are incurred from regenerating vegetation.

The outlook for the future remains positive. The majority of the harvested timber is aspen.

Priced Nonmarket Benefits:

The *Economic Account* indicates a present value of positive effects of wildlife benefits of $569,713. The manipulation of vegetation through timber management has increased the wildlife population which results in increased recreational use of the Forest. The majority of these benefits are associated with aspen management with the greatest impact due to regenerating aspen stands.

Non-priced Benefits:

Timber sales on the Chippewa National Forest improve habitat for both game and some non-game wildlife. Wildlife habitats are improved through maintenance of the aspen forest, improved tree age-class diversity, and spatial locations. Deer production is key to the survival of gray wolves. The Forest's wolf population has been gradually increasing due to an improved prey base and habitat protection. Recreation enterprises, dependent on wildlife experiences, profit from increased wildlife populations. This is a result of timber sales designed for multiple-use benefits.

Vegetative fuel breaks, tree age and species diversity, created through responsible timber management, reduce the risk of catastrophic wildfire. Also, insect and disease outbreaks can be reduced through active vegetative management implemented by timber sales.

Road maintenance and reconstruction associated with timber sales improve the quality of dispersed recreation by providing access for berry picking, hunting, bird watching, camping, fishing, fuelwood gathering and fur bearer harvesting.

Long-term visual quality is also improved through maintaining a diversity of tree species, sizes, and ages.

EMPLOYMENT, INCOME, AND PROGRAM LEVEL ACCOUNT

PURPOSE

The purpose of this is to provide information on the social and economic impacts from the outputs and activities of the 1998 timber harvests. Different from the *Economic Account* (which relates to the land and its resources), the *Employment, Income, and Program Level Account* relates to people and their livelihood. This account focuses on the economic importance and social relationships between the Forest's timber sale program activities/outputs and the local economy.

The economic and social impacts for this account are based upon the timber expenditures and revenues. The significance of social and economic impacts depends on how closely related the management of the Forest is to the way of life of the people in the local area. This account describes and displays this relationship using economic indicators such as employment, income, and 25 percent fund payments to local communities.

A computer model called IMPLAN was used to derive the impacts shown in the *Employment, Income, and Program Level Account.* IMPLAN is an input-output model otherwise known as a general equilibrium model. Information such as timber harvest level is put into the model. The model then calculates the rippling effect of this harvest level on the local economy in the form of jobs and local income. IMPLAN is often used to explore the effect on a local community of increasing and decreasing harvest levels.

The IMPLAN analysis required that an impact area be defined along county boundaries. The following counties in north central Minnesota constitute the social area considered in this analysis: Beltrami, Cass, Hubbard, Itasca, and Koochiching.

METHODS AND ASSUMPTIONS

The Minnesota counties of Beltrami, Cass, Hubbard, Itasca, and Koochiching were included because they contain significant amount of National Forest System land or because of their economic reliance on timber from the Chippewa National Forest.

The size of the impact area affects the analysis results. Some timber is processed outside the area. Additional positive economic impacts of the Forest occur outside the impact area but have not been estimated in this account. A larger impact area would encompass more of the benefits produced but would also dilute those benefits from the Forest in a larger economy.

DISPLAY OF THE EMPLOYMENT, INCOME, AND PROGRAM LEVEL ACCOUNT

The following table displays the timber program direct, indirect, and induced job impacts, the value of income to the communities and Federal taxes paid on this income, and the past fiscal year's 25 percent fund payments to State and local governments. Also displayed is information on the Forest's timber sale program, such as budget; volumes offered, sold, and harvested; acres treated; and a summary of the Forest's road program.

FY 98 TSPIRS
EMPLOYMENT, INCOME, AND PROGRAM LEVEL ACCOUNT

I. Employment and Income Information

1. Timber Related Employment	490	Jobs
2. Employment Related Income	$32.00	Million
3. Federal Income Taxes Generated - Impact Area: Beltrami, Cass, Itasca, Koochiching, and Hubbard Counties, Minnesota	$ 4.80	Million

II. Timber Program Information

1. Volume Offered	61.7	MMBF
2. Volume Sold and Awarded	60.0	MMBF
3. Volume Harvested:		
- Sawtimber	9.1	MMBF
- Pulpwood	51.3	MMBF
- Other-Pay Fuelwood	0.0	MMBF
Total Harvest Volume	60.4	MMBF
4. Total Area Harvested	6,095	Acres
5. Free Use Firewood	0.5	MMBF
6. Nonconvertible Products:		
- Christmas Trees Sold	574	Trees
- Other Products Removed	$3,347	
7. Regeneration Treatment	3,677	Acres
8. Timber Stand Improvement	1,671	Acres

III. Forest Road Information
(In Support of the Timber Program)

1. Road Construction:		
- Appropriated Construction	0.0	Miles
- Purchaser Credit Construction	3.9	Miles
Total Construction	3.9	Miles
2. Road Reconstruction:		
- Appropriated Reconstruction	0.0	Miles
- Purchaser Credit Reconstruction	3.3	Miles

Total Reconstruction	3.3	Miles

Direct Jobs - Are the number of jobs generated from production and marketing of timber products on the Forest.

Indirect Jobs - Result from activities of supporting industries that produce and sell their products to the industries directly impacted.

Induced Jobs - Come from income expenditures of employees and owners of directly and indirectly impacted industries in the local economies.

Approximately three jobs directly related to timber production on the Chippewa National Forest resulted from each million board feet of timber produced. These jobs tend to be woods-working jobs and, therefore, labor-intensive. Other jobs result from indirect and induced impacts of the timber sale program. Total jobs should be interpreted as the number of jobs which could be lost if industry did not absorb the jobs which the Forest is currently supporting. Total income generated is **$32.0** million, and is spread across all impacted services and industries. It should not be interpreted as the income directly attributable to the **490** jobs impacted.

INTERPRETATION OF EMPLOYMENT, INCOME, & PROGRAM LEVEL ACCOUNT

The new and expanded markets at Duluth, Cloquet, Grand Rapids, Bemidji, and International Falls have had substantial impacts on the mix of employment and income associated with the production of timber products from the Chippewa National Forest. This is reflected in this analysis by the revenues received and the employment and income data associated with the timber sale program on the Forest.

Demand for forest products is expected to remain high or increase. The Forest has had an adequated supply of conifer to meet the needs of our local industry, but continued demand for conifer has resulted in a product shift to the more readily available smaller products. And even with continued emphasis on aspen production demand may exceed our local supply.

A continued high or an increasing demand for forest products may create an increased reliance of local industries on private and other public lands to meet the total demand for forest products.

During 1998, approximately 60.4 mmbf was harvested. Advertised timber sales were sold with an overall average of three bidders per sale. This indicates continued high interest in timber grown on National Forest System lands.

In summary, markets for timber products remain good. National Forest timber harvests have a positive effect on employment and income in northern Minnesota.